

AN ENERGY PRIMER

Recent fluctuations in global oil prices prompted by slower than forecasted economic growth raises new questions for the world's single largest energy source. Oil prices fluctuate with free market conditions of supply and demand. However, in an effort to reduce greenhouse emissions and increase diversification governments have implemented mandates to influence the global energy matrix.



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About John Kaweske

John Kaweske serves as Chairman and CEO at Bio Clean Energy S.A. in Sao Paulo, Brazil. Bio Clean Energy, S.A. is a government-licensed producer of biodiesel in Brazil selling to Petrobras, S.A. Mr. Kaweske is co-author of three patents on biodiesel production technology. Mr. Kaweske started his career in 1990 at D. Blech & Company as an analyst focused on the private sector of biotechnology. In 1993, he served as Director at First Atlantic Capital in New York, NY. At First Atlantic Capital in 1995, Mr. Kaweske notably founded, Genome Technologies, Inc., according to Bloomberg news, the second private company focused on genetics sequencing. From 1995 through 2002, Mr. Kaweske served as President and CEO of Grace Investments until the Company was sold in 2002 to Cardinal Capital Management, Inc. where worked for 2 years as Senior Managing Director as stipulated in the Share Purchase Agreement.

Historically, developed countries have sought to diversify their energy matrixes after the crisis of the 1970's. First with nuclear power and hydroelectric and most recently with renewables such as wind power and solar energy. Although diversification remained the goal, rising demand as a result of globalization has curtailed and absorbed the impact of the ever-increased energy supply.

Today, government policies greatly influence a preference for the type of energy that is both produced and consumed independent of efficiency. The relative market price per Btu (Btu is a measurement of British thermal units equal to approximately 1055 joules) fluctuates greatly as governments tether free market forces affecting both production costs and market prices.

Globally, petroleum accounts for approximately 34% of the energy matrix, down from its high of 48% in 1973. While the "Big Three", oil, coal and natural gas account for 88% of global energy consumption down from 94% in 1973. Irrespective of the cost per Btu, the trends favor continued growth in energy renewables. The European Union has a baseline mandate of 20% of energy from renewables by 2020.

The lowest cost of Btu's and one of the cleanest sources of energy is hydroelectric power. Brazil, Canada and China amongst the largest producers are endowed with immense water resources to generate hydroelectric power. Brazil generates 85%, Canada generates 65% and China generates 22% respectively of their total electricity requirements with hydroelectric facilities. Although, in fairness China's produces 61.4 Mtoe (million tons of oil equivalent), Canada 36.9 Mtoe and Brazil 29.9 Mtoe per year from hydroelectric sources. Canada could easily generate 100% of its power from hydroelectric but is restricted due to government policy as a result of environmental concerns.

The United States is in the throes of a major government policy initiative that favors the cleaner renewable sources of solar and wind energy. Current generation from solar and wind is still less than three percent of the electric power generated but forecasts show in twenty to thirty years these alternative energy sources will account for 15% of total electric generation in the United States if the government succeeds in maintaining its objectives.

Solar only makes economic sense in the desert areas of the United States where there is at least sixty percent of the days with significant sunshine. Phoenix and Las Vegas are prime locations that receive on average 85% percent of their days with significant sunshine. One of the largest solar stations in the United States, Ivanpah (64km southwest of Las Vegas) has yet to achieve its design capacity as frequent dust storms are prevalent and reduce optimal conditions. Work is still underway to create self-cleaning mirrors that do not require cleaning with water.

The Western United States is in the midst of the worst drought in its history obtaining needed water for solar panel cleaning could prove to be more costly than budgeted. Clearly, the substantial reduction in solar panel prices because of lower material, manufacturing and greater competition have resulted in solar generation being more competitive with other sources of electric generation. Regardless, natural gas being priced at less than three dollars per Mcf (measurement of 1000 cubic feet of natural

gas) still has a significant cost advantage to solar power.

The State of California has nearly the GDP (Gross Domestic Product) of the Country of France (number 6 in the world). When Californians have goals to reduce greenhouse emissions by 42% by 2030, the world listens. The state government has mandated that renewables will eventually account for a minimum of 33% percent of the electric grids energy matrix by 2020. As the Btu's of renewables are more expensive than the, "big three" costs are being passed on to consumers in the form of higher

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energy bills. Californians pay on average 35% more for electricity than the remainder of the United States.

Natural gas is likely to maintain its superior competitive position to other energy sources because prices will remain low as a result of the substantial increase in natural gas reserves found in the United States. Natural gas is a cleaner burning fuel as compared to other carbon-based fuels. In many places, the use of oil for generating electricity is gradually being phased out and replaced with natural gas generated power. Another advantage for natural gas is if a particular region of the United States experiences beyond forecasted growth in permanent,

demand, natural gas utility stations can be constructed in less in six months.

What is the outlook for oil pricing and demand in the United States? In the last six years oil production in the United States increased by four million barrels to almost ten million barrels per day. Aside from Middle Eastern oil producing nations, most of the world cannot meet demand without imports of oil.

West Texas intermediate oil prices declined from USD\$100 a barrel to the present USD\$45 a barrel. Although, the United States has become more self-sufficient in meeting total demand it still requires imports of more than eight million barrels per day. With the price of oil at USD\$45 a barrel and a 50% decline in drilling rigs in service, high cost producers may stop producing upwards of 1 million barrels per day. Most recently in the United States there has been a reduction in supply due to one large refinery being closed for renovations and a decline in Canadian imports that resulted from an explosion at the Fort McMurray, Athabasca tar sands production facility.

The Energy Information Administration, "EIA" estimated United States liquid fuels consumption grew by 70,000 bbl. (barrels per day) or 0.4% in 2014. EIA forecasts for 2015 total oil consumption growth of 400,000 bbl. or 2.1%, which is in line with projected United States GDP growth. This is taking place despite the anticipated growth in alternative energy production. EIA forecasts oil consumption in 2016 will also grow by 70,000 bbl.

In conclusion, the major unknown for markets is GDP growth or lack thereof across global economies. Presently, we do not know the extent of China's, the world's second largest economy's, slowdown and its global impact. The other major unknown is to what extent Europe will succeed in stimulating growth as a result of quantitative monetary policies. Finally, we do not know the depth of the recessions in the developing countries of the world, such as Brazil. We do know that we will begin to see guidance over the next few months from global economic data and most certainly the markets will respond.

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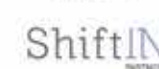
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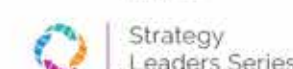
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